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Combining Knowledge Mapping and Videoconferencing for Open Sensemaking Communities

Alexandra Okada, Eleftheria Tomadaki,
Simon Buckingham Shum and Peter Scott

OpenLearn Initiative, Knowledge Media Institute, The Open University - UK

1- Introduction

The Open Educational Resources (OER) movement has been growing rapidly, opening up new opportunities for widening participation (Willinsky, 2006). OpenLearn is an OER pilot project developed by the UK Open University (OU) [<http://www.open.ac.uk/openlearn>], and launched in October 2006, supported by the William and Flora Hewlett Foundation. OpenLearn has published 3371 hours in the LearningSpace and 5194 in the LabSpace of OERs designed specifically for distance learning (the OU's core business), and covers a range of subjects from arts and history to science and nature. There are more than 300 units at all study levels from access to higher education, graduation and postgraduation.

Our current work is to investigate how these tools can be used to foster *open sensemaking communities* (Buckingham Shum, 2005) around the OERs, that is, the interpretative work that must take place around any resource for learning to take place. How can we support this critical activity in an OER context when learners must find and engage with peers themselves, if they do not wish to study alone?

This paper introduces the e-learning environment that has been developed after the first year of OpenLearn, focusing on the uses made of two sensemaking support tools, *Compendium* for knowledge mapping, and *FlashMeeting* for videoconferencing.

2. e-Learning Environment

OpenLearn is published on the open source Moodle platform, augmented with sensemaking support from knowledge media technologies including the two described here: Compendium and FlashMeeting.

Compendium is a software tool for visual thinking, used to connect ideas, concepts, arguments, websites and documents. It can be used as a sensemaking tool to link, interpret and annotate resources within the Open University site, as well as out to any other resource on the web. Maps can then be searched, analyzed and visualized in new ways to help students spot new connections and find new peers. FlashMeeting is a lightweight web videoconferencing tool designed to enhance community awareness, by mapping the social interactions, as well as the social impact of learning objects in communities (Scott, Tomadaki and Quick, 2007).

Through FlashMeeting and Compendium, participants can structure, acquire and reconstruct the knowledge shared during the discussions and argumentations in online meetings. They can use these tools to:

- plan meetings and map the discussion;
- manage collective knowledge by mapping the most important questions, ideas, and arguments as they arise;
- summarize important topics graphically;
- reinterpret significant content discussed, reconstruct maps and share new representations for next meetings;
- visualize the process and plan interventions to improve learning.

3 Videoconferencing

3.1 FlashMeeting Live and FlashMeeting Memo

Desktop videoconferencing is an important tool for online learning as it allows individuals from different parts of the world with common learning interests to connect together and form communities of practice. It is ideal for peer-to-peer collaboration and can also be used in different ways, such as recording the webcast of physical lectures and conducting virtual seminars and interviews. In an open learning context, in addition to other well-established ways of communicating such as email, forums and instant messaging, videoconferencing makes multimedia synchronous communication possible:

Roger: "When on-line learning just came it was just an expansion of the email system, it's really terrific to see some of the directions which it's gone, including this type of online discussion that we're having right now"

Bob: "This is a great addition to the class, Moodle just has a text chat, this FlashMeeting is actually free servers, which ah actually comes from the UK. So, our communication goes through England, ... and it's entirely free"

(excerpt from a public FlashMeeting on statistics:

<http://fm-openlearn.open.ac.uk/fm/fmm.php?pwd=608a58-162&jt=00:04:30>)

In OpenLearn, synchronous communication is enhanced with instant messaging and videoconferencing. The *FlashMeeting Live* and *Memo* applications have been integrated with the LabSpace website in a FlashMeeting 'block'. As long as the Adobe Flash™ browser plug-in is installed, the users who have signed up with a LabSpace account can access the FlashMeeting demo to familiarise themselves with the concept and function of simplex audio technology, allowing only one person to broadcast at any one time. The block includes links to the QuickStart guide, the Demo, the meeting booking page, a page automatically generated by the system showing the events in which the user has participated, the public meetings and public replays. The users can book a meeting of up to 25 attendees and forward the meeting URL generated by the system to the other participants via e-mail or instant messaging, having the options of making the meeting or its replay public. Users can instantly access the event at the time of the meeting by clicking the meeting URL, and view and hear other participants, broadcast their image and sound, raise a symbolic hand to speak and take turns in the interaction, receive and send group or private text messages, access a whiteboard and upload slides, which can be viewed and annotated by all meeting attendees. All meetings are auto-set to be recorded.

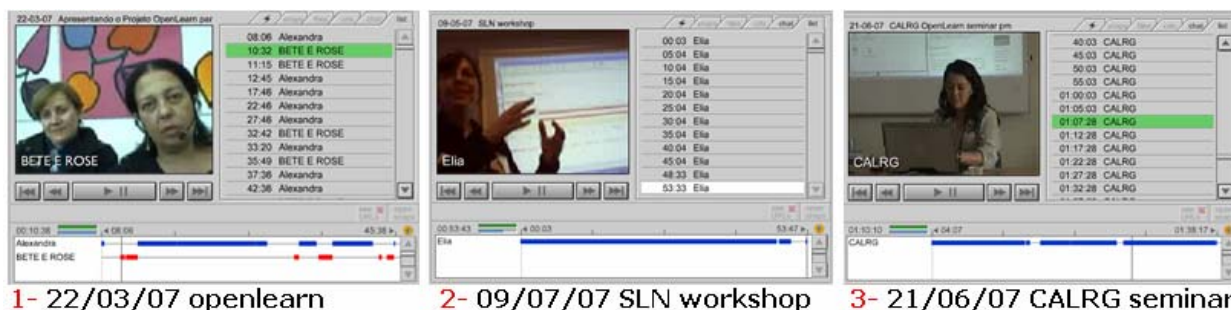
Event users themselves have instant access to the *FlashMeeting Memo*, i.e. the recording of their meetings, by clicking on the meeting URL. The Memo can be replayed, edited and annotated. In addition, a list of contacts is automatically generated according to the meeting attendees. In this way, the users can create their own 'buddy list' by marking a person as a 'contact' for social networking. End-user support is provided through the FlashMeeting forum, whilst users can get help initially by reading the QuickStart guide or by following the 'Desktop Videoconferencing' course, uploaded in LabSpace. Syndicated replays appear in a publicly accessible webpage, with the FlashMeeting folksonomy, created according to the keywords added by the meeting bookers:

Figure1. Public Replays and the FlashMeeting-LabSpace folskonomy



Communication patterns in FlashMeeting emerge from various models of online meetings, such as social and technical meetings, teachers-learners meetings, project meetings, interviews, peer-to-peer meetings and seminars. The users have the option of using one or a combination of the communication channels available in FlashMeeting. For example, in a virtual seminar, the lecturer can broadcast image and sound or use the text chat to answer to students' questions, while the students may only use the chat messaging function to ask questions and not interrupt the seminar flow. The figure below includes screenshots of the replays of public FlashMeeting events; a workshop with multiple participants on the left and a conference paper presentation with one participant on the right:

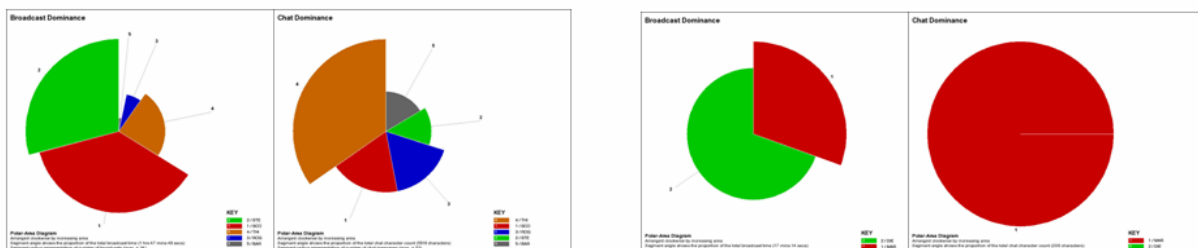
Figure2. Public replays in Flashmeeting



On a Memo replay page are also automatically generated links to the chat transcript, and to visualizations of participant broadcast and chat dominance which convey at a glance the 'shape'

of the meeting in terms of balance of speaker. These shapes illustrate the different kinds of videoconferencing events, held in an open learning context. The automatically generated event shapes are inspired from the polar area diagrams, which were first published by Florence Nightingale (1858), representing the causes of death during the war in Crimea. In the figure below, the first pair of diagrams on the top left corner represents a moderated project meeting, where the moderator in green dominates both broadcast and chat channels, while other users are represented in different colours. In each pair of diagrams, the diagram on the left shows the broadcast dominance (the circle diameter shows the ‘air’ time, while the circumference shows the turns taken), while the diagram on the right represents the chat dominance (the diameter showing the characters typed and the circumference showing the number of text messages sent). The top right pair of diagrams represents a virtual seminar, which is more interactive than a project meeting. The first pair of diagrams in the middle shows evenly spread broadcast and chat dominance amongst multiple users, illustrating a peer-to-peer event. The banal shape of an interview is shown in the second pair of diagrams in the middle, representing two participants, with the interviewer taking less than half of the air time taken by the interviewee, and dominating the chat, not interrupting this way the interviewee. The pair of diagrams on the left bottom corner shows the shape of a webcast, with a main node broadcasting nearly 100% of the air time, and different users exchanging chat messages. The last pair of diagrams shows a more interactive event, a video lecture, where the main node interacts via all communication channels with the audience.

Figure3. Polar area diagrams representing the broadcast and chat dominance in a range of FlashMeeting events adapted from Scott et al, 2007



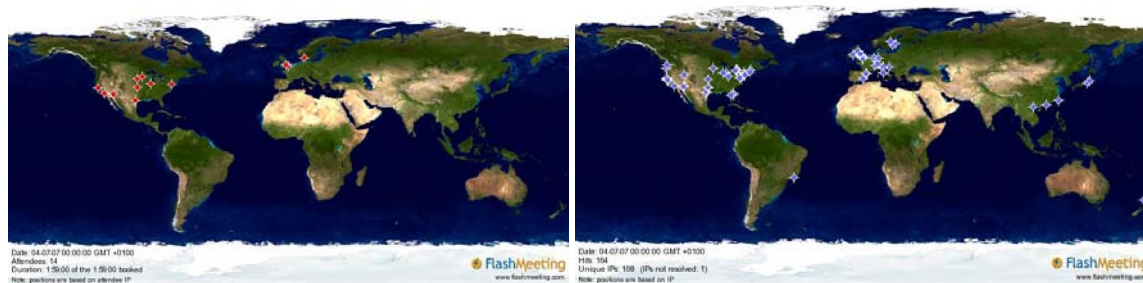
3.2 Usage data

In three years of experimental research, the FlashMeeting application has been offered to a range of industries, including schools, universities, companies and research institutes. At the moment, it is used by over 35 European projects and numerous knowledge transfer communities worldwide. Since the October 2006 launch and during the first 9 months, over 600 recordings are hosted on the FlashMeeting-LabSpace server, and over 300 bookings do not include the word ‘test’ in their title. Over 50 recorded events have been made public, mostly including presentation-like events, webcasts, video lectures, interviews and peer-to-peer meetings.

The figure bellow indicates the impact of a live FlashMeeting event, including 14 live attendees from America and Europe represented as red dots and its replay worldwide, including 108 viewers from different parts of the world represented as blue dots plotted on the map.

By stimulating the syndication and reuse of videoconferencing events, we hope to create new learning objects, which can be shared and browsed through a folksonomy of keywords, helping the learners to select which objects are important and appropriate in their learning experience. A series of similar events published in LabSpace on the one hand shows the creation of communities of common interests, and on the other the tendency of sharing learning experiences with anyone in the world who wishes to learn from them, be it seminars or peer-to-peer events, contributing to the culture of open content.

Figure4. The worldwide impact of a FlashMeeting live event and its replay



3.3 Linking public work and public learning to open learning

As part of our planned migration and marketing strategy for FlashMeeting Open and Public work the parallel Open FlashMeeting service has been very successful. We ran the experimental server (<http://flashmeeting.open.ac.uk/public/>) as a “staging server” for the LabSpace. A substantial proportion of the established FlashMeeting learning communities (hosted previously on this staging server) have migrated gradually to the LabSpace. This migration was gradual, to not risk negative disruption to these very productive and active communities. Our strategy involved helping these communities to understand the power of ‘opening up’ their learning. The work to date provides the following update on the research issues that motivate this work:

- Effective support for peer learning in a synchronous Web 2.0 world is realised through the tool support forum, and supporting material uploaded in LabSpace, including activities to be followed. Social networking is being facilitated in FlashMeeting through the webpage ‘My Events’, which allows the users to create their own ‘buddy list’, including their contacts according to the participants of the meetings they have experienced. Research has been conducted towards the direction of different types of online events with FlashMeeting..
- Re-use and syndication of meetings as shared, public content is supported in the QuickStart guide, as well as the FlashMeeting learning Unit. Over 50 public replays can be viewed at the FlashMeeting LabSpace server, accessed via a folksonomy of keywords, generated according to the keywords added by the meeting bookers. To date, a series of video lectures, webcasts, interviews and peer-to-peer events have been made public and people from different continents have viewed their replay.
- Public replays created by communities of learners and teachers can be browsed through the LabSpace FlashMeeting folksonomy, providing clues as to whether the events can be relevant to a learners’ curriculum or not. Logs of how many times a replay has been viewed can show the importance of a public replay and the learners’ preferences.

4 Knowledge Mapping

4.1 Compendium

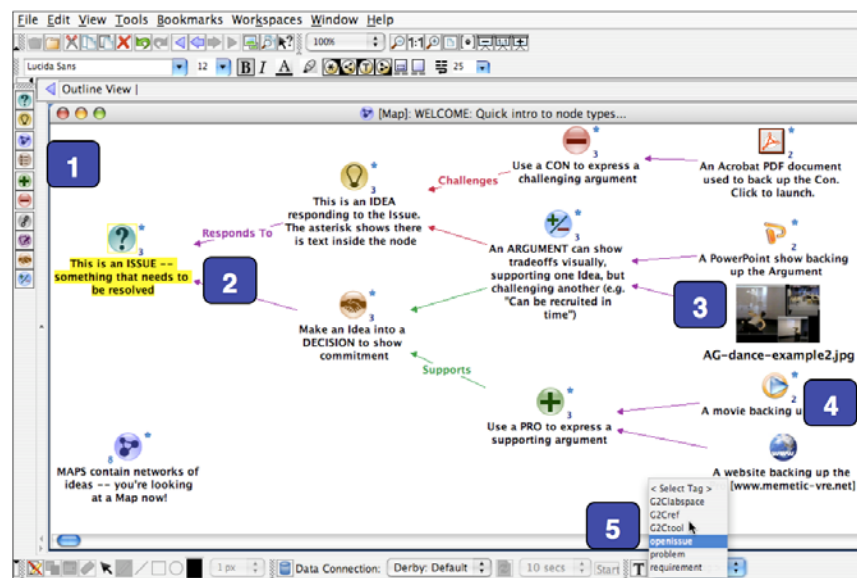
The Compendium software tool developed by the Knowledge Media Institute at OU-UK provides a visual user interface for users (e.g. learners, educators or software developers) to cluster, connect and tag icons representing issues, ideas, concepts, arguments, websites or any media document. Through Compendium, learners can represent their thoughts and reflections while they study or work on a unit. They can share their knowledge maps with others in order to learn together. Knowledge maps can be very useful as a summary of a topic, collection of important resources and as a learning path through the maze of the Web.

Knowledge Mapping is a concept which comprises techniques and tools for visualizing conceptual models as explicit structures graphically. Knowledge mapping techniques includes:

- conceptual models of any subject such as concept maps,
- personal plans such as mind maps, and models of dialogue and
- argumentation such as dialogue/argument maps (Okada & Buckingham Shum, 2006).

Students can sketch these graphical schemes on paper or use a mapping software tool to create knowledge maps. In this case, hypertext maps can be published on the web, users can navigate in hyperlinks, download, edit and upload it again.

Figure5. Compendium's user interface for linking issues, ideas, arguments and documents.



This example illustrates how to create a map in Compendium using dialogue mapping technique:

1. Drag and drop a question-icon (?) from the palette onto the map... and type a key issue, problem, or question.
2. Create new nodes such as (💡) for answers, concepts or data; (🔍) for arguments, choices or possibilities; (+) for supporting arguments; (-) for counterarguments. If you want to make connections, over the icon with the right button of the mouse, drag then an arrow will appear and drop it onto the other icon.











3. Pictures, sites and documents from the web can be added into this map, dragging and dropping the media resource.
4. A number superimposed on a node (e.g. 2) means that it appears in more than one map. The same idea or document can play roles in multiple contexts and conversations, yet be linked. Using the mouse over the number you will see all of maps related to that node.
5. User-defined keyword tags can be annotated onto nodes to help when searching for related material across multiple maps.

The starting point for OpenLearn was that (like the other KMi tools) Compendium already had an established user community, who have found diverse applications for it (see the Compendium Institute website: www.CompendiumInstitute.org). The software development activity in Phase 1 has been to integrate Compendium with Moodle, simplify its user interface and default settings for new users, and to further refine and extend its capabilities. In addition, we have published numerous knowledge map examples and tutorial materials in the LabSpace, tailored to the OpenLearn end-user communities.

The features of Compendium for OpenLearn are:

- Simplified default menu removing the more advanced features (which can be turned back on if required)
- Knowledge Maps Web export with several options: Web maps (html), Jpeg File, XML and OpenLearn knowledge maps that can be uploaded to the OpenLearn and automatically linked with a unit.
- Web URLs dragged from OpenLearn or other Hewlett OER projects into Compendium are recognised, and assigned the source site's logo
- Users can categorize each node using a “tag” interface. Through keywords or short phrases they can filter them based on tag combinations.
- Users can browse and exchange maps from Knowledge Mapping Moodle block

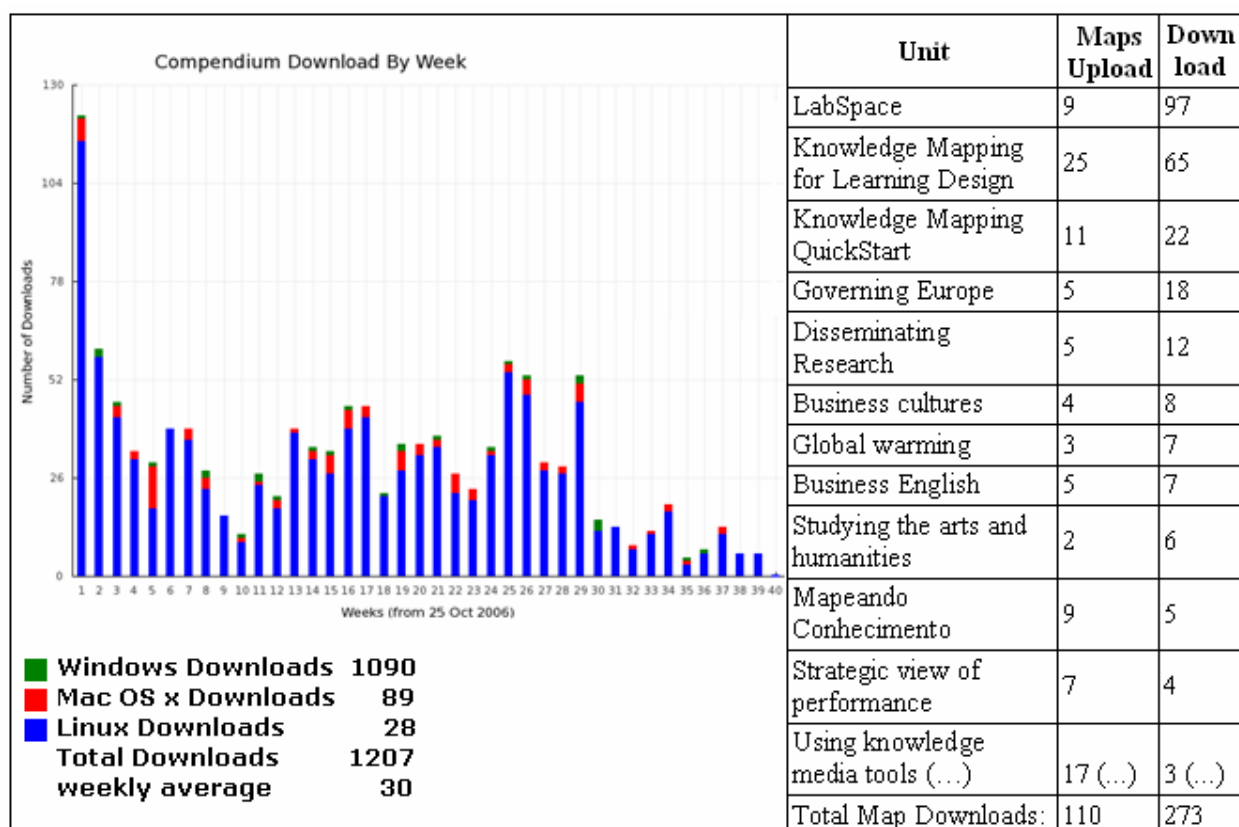
Table1. Examples of icons to represent OER from different Open Content Initiative

	Open Learn – Learning Space		Development Gateway
	Open Learn –Labspace		Japan OCW Consortium
	OU Open2.net (BBC)		Physics Education Technology OER
	MIT Opencourseware		The African Virtual University
	CORE – China		Creative Archive

4.2 Usage data

During nine months, from 25th Oct. 2006 launch to 25st Jul. 2007, the Knowledge Mapping reporting system (integrated into Moodle) shows 1207 downloads of the Compendium tool, with coverage across the different internal OU communities, with strong representation from the current student community, and over double this number from elsewhere in the world.

Figure6. The number of users downloading Compendium, uploading and download maps

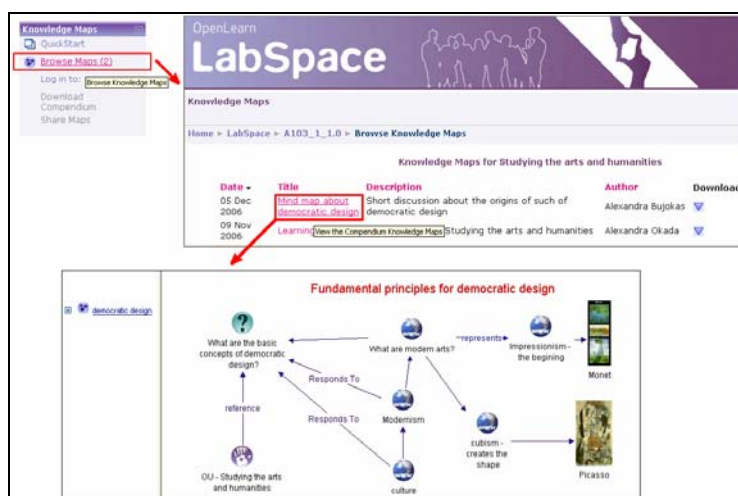


4.2 Linking Knowledge Maps to OpenLearn

In this session we presented some roles for Knowledge Maps in the context of OERs.

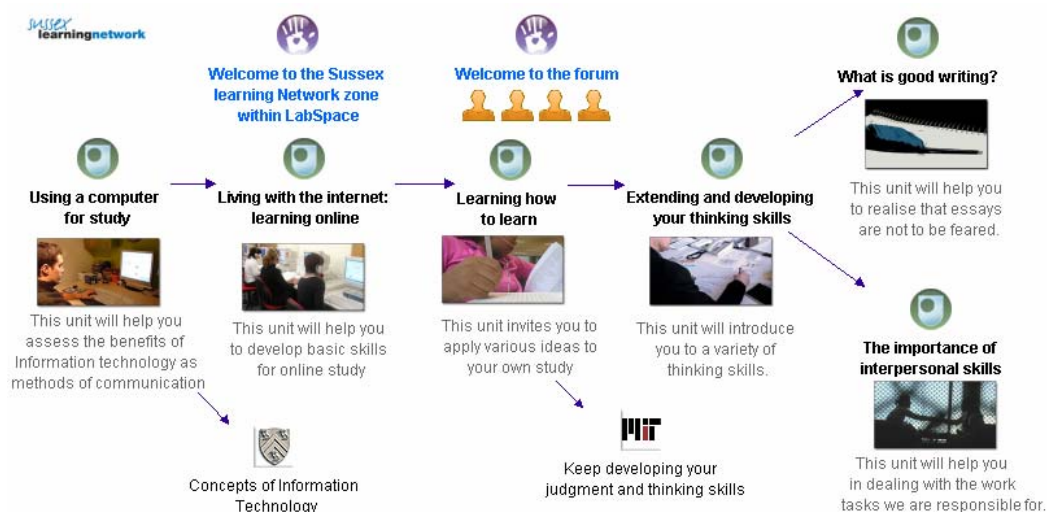
Maps as a strategy to study an OER: The figure below shows a knowledge map designed by a social science student. This mind map illustrates new ideas related the OER unit (*A103: Studying the arts and humanities*). Other learners interested in the same topic (e.g. democratic design) can access this map within their Web browser, and download the file to edit in Compendium,

Figure7. Studying the arts and humanities through a knowledge map
http://labspace.open.ac.uk/file.php/1801/knowledge_maps/1165338042/abujokas.html



Maps as lightweight ‘remixes’ of OERs: Another kind of representation is a Learning Path Map, a sequence of learning resources significant to a learner or as a resource for educators to attend their specific needs. A learning path may be an interesting sequence of reference nodes hyperlinked to activities or content from OERs and other resources. It may represent an organised structure showing prerequisite knowledge, learning objectives and estimated study hours. The map below is from SLN Sussex Learning Network – collaboration area. It illustrates the extension of the OU’s default path, by adding in resources from MIT and Connexions:

Figure8. “Creating a Learning Path Map”: SLN learning Network
http://labspace.open.ac.uk/file.php/3027/knowledge_maps/1187090149/sln_learning_path.html



Compendium thus provides a visual authoring tool for the rapid (re)sequencing of learning resources, a form of high level “remixing” of the OU’s OERs. The learning path map provides learners and non-technical educators with a way to quickly drag+drop websites, documents and media clips into a map, link them and publish them.

Knowledge Maps as Hypermedia OERs: Compendium has also been used to create hypermedia OERs, Web versions of interactive resources providing multiple, non-linear paths through multimedia information spaces. One of these projects is the EPOCH resource on the history of psychology, illustrated below:

Figure9. The EPOCH hypermedia OER.

http://openlearn.open.ac.uk/file.php/2850/knowledge_maps/1183374514/epoch.html



EPoCH - Exploring Psychology's Context and History is a substantial content-based resource containing extensive psychology based subject information including text, video, images and audio. It presents biographical details of 100 psychologists as well as descriptions and links between psychology methods, contexts, perspectives and topics. Epoch maps enable OpenLearn users to explore the development of psychological thinking not only across time, but also within the context of social and historical changes; the development and application of different perspectives and methodologies; and through chains of influence between psychological researchers.

CONCLUSIONS

During its first nine months of existence, the OpenLearn project has engaged a critical mass of over 15,000 users, taking advantage of the OER to learn at their pace and time. So far, the knowledge media tools have been proved useful to help users connect with other open learners with similar interests and participate in online communities of practice.

In an open learning environment, desktop videoconferencing with FlashMeeting has been used not only for peer-to-peer collaboration amongst learners, but also for interviews, moderated project meetings and seminars, or webcasts of physical lectures and presentations. Compendium has been used for studying, remixing and develop OER. Several of these resources produced in FlashMeeting and Compendium have been reused worldwide by individuals from different corners of the world.

Our future research focuses on how knowledge media tools can enhance communication and support the collective construction of knowledge. We wish to give some insights to foster open sensemaking communities supporting them to produce learning objects, especially in combination with OER available in specific areas.

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